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DIVISION OF MYCOLOGY AND DISEASE SURVEY

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FOREST PATHOLOGY NOTES

Ross W. Davidson

1. Decay in Living Sprout Oak Trees

In 1934 (1) Stereum gausapatum was reported as the cause of decay in the heartwood of oak trees. More recent investigations in Virginia, New Jersey, and Pennsylvania indicate that this organism is probably the most important of all fungi that cause butt rot in sprout oak timber. In some 30-year-old stands as many as 30 per cent of the trees have been found to be infected with this fungus, but the percentage of infected trees is usually somewhat less. In other areas only a small proportion of the trees is infected. These investigations have been conducted in stands largely untouched by fire so this discussion does not include oak butt rots resulting from fire injury.

The incidence of decay due to S. gausapatum varied considerably with different species of oaks. Black and scarlet oaks seemed to be most

commonly infected, the number of trees infected varying from approximately 45 per cent in some areas to a much lower percentage in others. White oak usually showed less, and chestnut oak the least infection of all the species examined.

Stereum gausapatum also caused a more extensive decay, in the trees studied in this investigation, than any other fungus isolated. It has been found to advance to a height of 10 feet in 30-year old trees and 18 feet in 47-year old trees. Present indications are that entrance into the trees is usually gained from the old stump, and occasionally through dead or cut stubs of companion sprouts provided there is heartwood union with the living sprout.

Some of the decay fungi of minor importance that have been isolated from the sprout oaks studied are: Armillaria mellea, Hydnum erinaceus, Stereum frustulosum, Polyporus versicolor, P. sulphureus, P. spraguei, and Daedalea quercina. None of these occurs in unusual abundance in young sprout oak timber.

The field studies on the butt decay in sprout hardwood stands are being conducted by pathology technicians working on Emergency Conservation Work funds. The factors associated with high and low decay hazard are being studied also in order to determine the best methods of avoiding decay in the handling of sprout hardwood stands. The isolation and identification work is being handled in the Washington laboratory by regular personnel assisted by E. C. W. laboratory technicians.

2. Fistulina hepatica Causing "Brown Oak"

Fistulina hepatica has frequently been isolated in the course of the sprout oak study mentioned above. It occurs in the parent stump or the lower few feet of the heartwood of living sprouts. In no instance has it been associated with any apparent disintegration of the wood, which remains hard and heavy.

In advanced stages of infection this fungus colors the wood a dark brown (Prouts brown, Ridgway, Color Standards, 1 12) similar to the type of wood described by Groom (2) as "brown oak." In the incipient stages the heartwood has a mottled grayish brown ("tortoise-shell" variety described by Groom) appearance that merges gradually into a very light brown discoloration near the upper limits of the infection. Such wood is described by Groom as being of value for the manufacture of furniture.

Fistulina hepatica is very characteristic in pure culture as it usually forms the Ptychogaster (3) stage on ordinary culture media such as potato-dextrose or malt-extract agar. This may be the Leptoporus variegatus var broomianus mentioned by Groom as having been associated with two cases of brown oak with which he worked.

Groom also found a yellow Penicillium-like fungus associated with brown oak in some instances and seemed to consider it a conidial form of the organism causing the discoloration. The writer has not seen such a conidial stage of Fistulina but has frequently isolated a yellow Penicillium-like fungus, Paecilomyces varioti, from brown streaks in the heartwood of living sprout oak trees. Such brown discolorations could seldom be confused with Fistulina infections, but it is possible for it or a closely related species of Paecilomyces to be present in association with Fistulina.

No difficulty has been experienced in isolating Fistulina from typical brown oak. It is usually obtained in pure culture from both advanced and incipient stages of infection. The mycelium is white and has a characteristic appearance. The Ptychogaster sporophores do not begin to form until the cultures have been incubated at room temperatures for about six weeks.

3. Rhizina inflata on Red Pine Seedlings

In September, 1934, Dr. Carl Hartley's attention was called to a dying of red pine seedlings over a limited area (about 10 by 8 feet) of seed beds at the Sunnyside, Maryland, State nursery. A fungus found fruiting on the soil in this area was later identified as Rhizina inflata. It seems quite probable that this fungus was the cause of the dying condition since Weir (6) and others have reported it as the cause of a similar disease of conifers.

This fungus has usually been found on burned over areas and on being questioned the manager of the nursery stated that a brush pile had been burned on or near the diseased seed beds. The size of the diseased spot increased very little after it was first examined.

4. Gonatorrhodiella parasitica on Trichoderma lignorum

Trichoderma lignorum (Tode) Harz has recently been reported as a parasite of Rhizoctonia (5) and other soil fungi. It was therefore of interest to the writer to find another fungus that seems to grow parasitically on Trichoderma sp. It was obtained along with Trichoderma from tissue plantings of a malformed Polyporus sp. and again from Betula nigra decayed by Fomes sp. It has been identified as Gonatorrhodiella parasitica Thaxter (4) which was originally found growing on Hypocrea.

An attempt to obtain this fungus in pure culture failed, although the Trichoderma was readily obtained free from the Gonatorrhodiella. Trichoderma grows much more rapidly than G. parasitica, usually covering the entire surface of the agar with a green spore mass before the parasite appears. G. parasitica grows slowly over the surface of such a culture and gradually covers it with a "tawny" red mass of conidiophores and spores.

5. Sclerotinia betulae on Betula nigra Seeds

On May 3, 1930 a Sclerotinia, identified by Miss E. K. Cash as S. betulae Woron., was collected on Betula nigra seeds about 10 miles west of Annapolis, Maryland. On April 14 of this year the writer again visited the same general locality and found it fruiting in abundance along the edge of a small stream.

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PESTALOZZIA BLIGHT OF JUNIPER IN CALIFORNIA

Pestalozzia funerea caused heavy losses in the stocks of small sizes of several varieties of Juniperus at one California nursery during the late winter and spring of this year. The stock was being grown in a large lathhouse. Similar stock has been grown in the same lathhouse for a number of years without appreciable loss. The loss this year is undoubtedly connected with the higher percentage of rainy or cloudy days as compared with other winters during the preceding decade. The effect of the moist, cloudy weather was heightened by the lath cover. While very troublesome in some parts of the world on small nursery stock of the Cupressaceae the fungus has rarely been of any consequence in California before. (Willis W. Wagener, Apr. 17.)

NOTES ON SOME DISEASES OF ORNAMENTALS

Thelma B. Post

LEAF SPOTS OF LEOPARD PLANT (LIGULARIA KAEMPFERI) CAUSED BY GLOEOSPORIUM: Two collections of L. kaempferi leaves with similar spots have been received by this office; one set of specimens was received from Virginia in January, 1932, and the other from Ohio in December, 1934. From the first specimens received, a Gloeosporium pathogenic to apple was isolated. The spots are 1 to 12 millimeters in diameter and occur either on the blade or the margin of the leaf. They are zonate with dark tan centers and deep purple raised margins.

GLOEOSPORIUM STEM-ROT OF GERBERA: Black necrotic lesions near the bud on stems of Transvaal daisy (Gerbera jamesonii), which caused the stem to droop and the bud to die without opening, yielded in culture a Gloeosporium sp. The diseased material was collected in a Long Island greenhouse in December, 1934. In inoculation tests the pathogenicity of the fungus to uninjured Gerbera stems was established; the symptoms induced consisting not only of girdling and collapse of the stem just below the bud, but also of necrotic streaks extending nearly to the crown.

BOTRYTIS SPOT ON GERBERA LEAVES: Leaves of Transvaal daisy (Gerbera jamesonii) collected in a Long Island greenhouse in December, 1934, displayed tan spots of irregular form and zonate markings 5 to 40 millimeters in diameter. The spots occurred either in the center or on the outer margins of the leaves. When dry, the spots were outlined by a deep purple line, but the tissue around the young, fresh spots appeared watersoaked. The infection was distributed throughout the house and affected several varieties, especially those having dense foliage and individually broad and soft textured leaves, in which the aggregate reduction of functional area appeared to be a significant loss. The spots were most numerous in a portion of the stock which had been hot-water treated to kill mites (Tarsonemus), occuring not only on leaves subjected to the treatment but also on others developed since. A Botrytis (of cinerea type) was isolated from the spots. Inoculations which included young and old Gerbera leaves, injured and uninjured, were made with the fungus. Typical spots were reproduced only on the young, injured leaves.

MOSAIC DISEASE OF ROSES IN ARKANSAS

On April 15, 1935, diseased rose shoots were received from Mr. Carroll S. Morrow of Hope, Arkansas, with the inquiry if a virus disease was involved. These shoots came from Mr. Bob Briant's rose garden at Hope, and were taken from two or three plants, standing close together, of the hybrid tea variety E. G. Hill. The leaves showed symptoms comparable to those of tobacco or potato mosaic. There was more or less severe distortion of the blades, with puckered and pouched

areas, dwarfing, and irregular yellow blotches and streaks occurring frequently on one side of the midrib, though occasionally on both sides, interspersed between darker green or reddish-green areas. The midribs and some of the larger veins were often abnormally curved, and lighter-colored areas frequently followed the veins. Viewed by transmitted light the veins appeared clear or colorless and lacking in chlorophyll. The internodes appeared to be shortened, and some of the stems were abnormally flat and resembled fasciated stems. Whether these fasciations were part of the mosaic symptoms or expressions of some other disease could not be determined from these specimens. Not all of the stems showed flattening and fasciation. The closed flower buds revealed a sickly yellow color, and compared with rose buds exhibiting varying degrees of abortion. As a whole, the symptoms were quite comparable to those described by White for rose mosaic, particularly the leaf symptoms as illustrated by him (Fig. 2 C and F, p. 90, Phytopathology, vol. 22, 1932.) Apparently this is the first finding of mosaic of roses in Arkansas. Does anyone have evidence of transmission of this disease by any means other than by budding? (H. R. Rosen)

PLANT DISEASES AND WEATHER IN VIRGINIA

H. A. Wingard

TOBACCO DOWNY MILDEW, NOT REPORTED SO FAR: Recently we received several reports from county agents that tobacco downy mildew (Peronospora tabacina) was showing up in plant-beds. We have checked up on most of these reports and so far have not found a single case of downy mildew. The injury that developed probably came from too much rain and low temperatures. During the past ten days there has not been much rain, and except for a few days of cool weather last week, the temperature has been pretty high. The danger from downy mildew probably is not so great now.

APPLE SCAB. The change in weather should be very helpful from the standpoint of controlling apple scab (Venturia inaequalis). During the early part of the season when it was raining every day it looked as though this would be a scab year. Probably most of this rainy weather came before the ascospores of the scab fungus began to be discharged. Weather conditions the latter part of April and up until the present time were very favorable for spraying and most of our growers were able to get on the pre-pink and pink spray applications.

BROWN ROT BLOSSOM AND TWIG BLIGHT OF PEACH: The outstanding development in the way of plant diseases so far is the development of blossom and twig blight of peaches caused by brown rot (Sclerotinia fructicola), which is more prevalent this season than I remember it to have been at any other time. It has been reported and specimens have been sent in from eastern Virginia, sections around Roanoke, and in

the extreme southwest section of the State. Many of the branches are completely girdled at the buds back to a distance of 12 to 18 inches from the tips. This condition was no doubt brought about by the fact that it rained practically every day during the first three weeks in April. During that time there were some very sudden drops in temperature, some of which came while the peaches were in bloom. In one orchard at Burkeville, injury was very severe on Rochester, severe on Carman, light on Hale, with none on Greensboro and Elberta.

OTHER DISEASES: Botrytis blight of Madonna lily has developed in severe form in some places. This disease was very prevalent last season. Powdery mildew of barley (Eripiphe graminis) has also appeared. Anthracnose of maple (Gloeosporium sp.) is beginning to show up. I feel that these diseases have been favored by weather conditions. (J. A. Ringgard)

LEAF CURL ON PEACHES IN ILLINOIS

In view of the fact that control measures for leaf curl (Exoascus deformans), as well as for other diseases, have not been applied so generally during the last year or two in Illinois as they would have been had normal crops been harvested, the prevalence of leaf curl in orchards this spring, tends to show the effect of treatment upon the occurrence of the disease. Table 6 gives reports of examinations made in 34 orchards located in 12 counties in the southern half of Illinois. The data were gathered by Mr. G. H. Boewe, Field Botanist for the Illinois State Natural History Survey, during the week beginning April 8, at which time the disease had developed to its full epidemic proportions throughout most of the southern part of the state.

It is interesting to note that, in the main, wherever winter treatment for leaf curl was given in the orchards the disease is either absent or present only in very small amounts, while in those orchards in which no treatment was given the number of diseased trees is almost always high and the percentage of diseased leaves often very high. In the one case (orchard No. 3 in Pulaski County) where a high degree of infection prevailed when treatment was applied, it is known that the spray was applied too late. There appears to be no entirely adequate explanation for the absence or near absence of infection in certain unsprayed orchards. (L. R. Tehon)

Table 6. Incidence of leaf curl (Exoascus deformans) on peach in Illinois, 1935

County	Control Used	Size of Orchard or Number of Trees	Percentage of Trees with Infection	Percentage of Leaves Infected on Diseased Trees	Average Percentage of Leaves Diseased in the Orchard
Cumberland	None	80 acres	0	0	0
Edwards	None	2 trees	100	6.20	6.20
"	None	80 trees	75	3.12	2.30
Jefferson	Lime sulfur	1200 trees	20	t	t
"	None	1500 "	3	t	t
"	None	2000 "	40	0.06	0.02
"	?	800 "	0	0	0
Johnson	None	15 acres	100	5.00	5.00
"	None	500 trees	100	20.30	20.30
"	None	800 "	0	0	0
"	None	1000 "	2	t	t
"	Lime sulfur	1000 "	0	0	0
Marion	Oil and Bordeaux	800 "	0	0	0
"	Lime sulfur	3000 "	0	0	0
"	Lime sulfur	1000 "	0	0	0
"	None	400 "	70	0.13	0.09
"	Lime sulfur	250 "	80	t	t
"	Oil and Bordeaux	450 "	0	0	0
Massac	None	400 "	100	11.60	11.60
"	None	300 "	100	1.70	1.70
"	None	1500 "	100	21.20	21.20
"	Lime sulfur	4000 "	0	0	0
"	Lime sulfur	1000 "	0	0	0
Perry	None	1000 "	95	0.20	0.20
Pulaski	None	45 "	100	58.30	58.30
"	None	70 "	100	75.00	75.00
"	Lime sulfur	100 "	100	22.90	22.90
"	Lime sulfur	125 "	31	2.50	0.80
Richland	Lime sulfur	6 "	0	0	0
Saline	None	50 "	0	0	0
"	Lime sulfur	50 "	0	0	0
Union	Lime sulfur	1000 "	88	t	t
"	None	1500 "	100	7.80	7.80
White	None	750 "	4	t	t

REPORTS ON APPLE SCAB

(See also p. 99 for report from Virginia.)

KENTUCKY: Have made observations on scab (Venturia inaequalis) development for past two weeks. Rain at least every second day during that time. Found first mature scab spores April 9. Spores were reported as being mature at Henderson April 4. At Lexington some varieties were in full bloom April 9 and all others in full pink. (W. D. Valleau. April 10)

WISCONSIN, Madison, Dane County: Fair amount of overwintering perithecia, below normal, but enough for good infection. Few mature spores April 5. Some discharge during rain of April 23. Grays Mills, Crawford County: Perithecia very few on Dudley. None observed on leaves from well sprayed orchard of Snow and McIntosh. Sturgeon Bay, Door County: Abundant overwintering of perithecia on poorly sprayed leaves. Slight in better sprayed orchards. Spores mature on April 19. (R. E. Vaughan. April 25)

INFLUENCE OF POTASH-DEFICIENCY RUST UPON THE YIELD AND QUALITY OF COTTON

W. H. Rankin and J. H. Moore

In the fall of 1934 there was very severe potash deficiency "rust" damage in the cotton fields of the peanut sections of the State. A preliminary study of this trouble, made by the Agronomy Department, North Carolina Agricultural Experiment Station, showed that the average amount of rust injury caused a marked decrease in boll size, seed weight and lint index. On the basis of boll size alone, the injury caused a 28 per cent decrease in yields. In addition, the results of fiber quality studies indicated that rust damage was usually associated with a shorter staple length, a weaker fiber, a wasty sample, and a lower grade.

This condition, though most prevalent in the Northeastern counties where peanuts and cotton are grown in rotation, is present to some extent in the entire cotton growing area of the State. Judging from field observations and interviews with a number of farmers whose cotton was severely damaged during the late summer and fall of 1934, it is generally believed to be more prevalent on soils that have been limed heavily, have poor drainage, have had a number of legume crops removed, or are naturally alkaline or near alkaline.

Farmers have for years been using kainit or muriate of potash as a source of potash in their fertilizer or sidedressing with potash in addition to the nitrogen on soils where cotton rust has been known to occur. During the depression years, farmers were forced to reduce the amount of fertilizer used and consequently the amount of potash

used was reduced. After a few years of this practice, the condition noted last fall was inevitable.

To those farmers who have had the quality of their cotton damaged and the yield reduced by the rust, we suggest the use of a higher percentage of potash in the fertilizer, or a side application immediately after chopping of 50 pounds of 50 per cent muriate of potash or 100 pounds of 20 per cent kainit. In extreme cases it may be necessary to use 100 pounds of muriate of potash or 200 pounds of kainit.

LOW GERMINATION OF COTTON SEED IN THE COASTAL PLAIN AREA OF NORTH CAROLINA

Gordon K. Middleton

Germination samples from 90 lots of cotton seed have been tested for growers of certified seed by the Seed Laboratory, North Carolina Department of Agriculture, during the current season. The samples have been grouped as coming from three general areas, and the results are shown in Table 7.

Table 7. Germination of cotton seed in North Carolina

Region of State	Number of Samples	Germination in Per Cent	
		Range	Average
Piedmont	33	65-97	88.5
Eastern Piedmont and Upper Coastal Plain	25	53-96	79.0
Lower Coastal Plain	32	13-81	45.0

Rainy weather during the early part of the picking season was probably responsible for the low results secured on many samples, a number of farmers reporting that their seed were sprouting in the boll before the cotton was picked. Such conditions naturally affected samples from the lower Coastal Plain area more than those from other sections, as a larger part of the crop was open in this area when the damage occurred.

Factors other than moisture may conceivably affect viability, and if there are such they should be determined. Any cultural practices which would improve the quality of our seed, or methods of handling that would preserve their viability would be worth a great deal. This

would certainly have been true in this State this year, for as the situation is now many growers have not been able to secure high germination seed with which to plant their crops. On many farms seeds with rather low germination are being planted. To offset this handicap as best they can, farmers are treating their seed and using an increased rate of planting.

DOWNY MILDEW OF TOBACCO

Downy mildew (Peronospora tabacina) was very general in Georgia, South Carolina, and eastern North Carolina during April but the attack was mild and caused little damage. More recently (May 3 to 7) infection has spread rapidly in the Piedmont area of North Carolina and at present practically every seedbed shows some mildew. Should weather conditions continue cool and moist severe damage will result. (E. E. Clayton, May 11)

VIRGINIA: See p.99.

TENNESSEE: Downy mildew on tobacco has recurred in Tennessee this year after not being observed last year. It was found May 3 and 4 in Smith and Wilson Counties, North-Middle Tennessee. The disease had killed about 50 per cent of the plants in one bed and did minor damage in another. The rainfall record at Carthage, which is within four miles of one of these beds, showed some rain for each of twenty days for the month of April, with the total of 3.33 inches fall which was 1 inch less than normal. The temperature was somewhat below normal for the same period. It will be recalled that this disease was observed in twenty-two counties of East and Middle Tennessee in 1933, which was probably its first occurrence west of the Appalachians. So far this year it has not been found or reported from this same area. (Paul R. Miller. May 6)

SOUTH CAROLINA: Mr. H. A. McGee, Tobacco Specialist, took me out to see the only diseased bed that we know of in the state. This plant bed consisted of 300 square yards and showed the disease throughout , a severe "burning" occurring over about one-half of the bed. The owner states that he saw a small diseased spot for the first time on March 22. Mr. McGee has requested the County Agents to notify him at the very first appearance of the disease in their counties. We also made numerous inquiries ourselves. The one diseased bed I have mentioned is the only one that we have heard of.

Mr. McGee tells me that if it rains the district south of Florence will probably plant most of the crop this week. If this can be done it seems that a good part of our tobacco district will have an excellent opportunity to escape serious damage from downy mildew this year. (Geo. M. Armstrong. April 3)

LEAF SPOTS OF MELILOTUS INDICA

J. L. Weimer

Early in January the writer observed many large, light brown spots on the leaves of Melilotus alba All. growing on the experimental farm of the University of California, Riverside, California. Many of the spots were marginal but others were not. Half or more of a leaflet was often involved as a result of a single infection. Further investigation disclosed a wilting of entire plants as a result of a stem rot, presumably due to the same cause. Small to medium sized sclerotia, at first white but later becoming black, were present on the surface of the decayed stems. Later apothecia were found in considerable abundance beneath the affected plants. Inoculations showed that the ascospores were capable of attacking and decaying the leaves and stems of M. indica. Measurements of spores and asci from the apothecia checked with those given for Sclerotinia sclerotiorum (Lib.) Massee. The fungi isolated from the leaf spots and from single ascospores were compared on a few media and showed some variation. Cultures were submitted to Prof. H. H. Whetzel who expressed the opinion that the fungus isolated from the leaf spot also was S. sclerotiorum. It seems pretty definitely established then that S. sclerotiorum can attack M. indica, causing a leaf spot and stem rot. This fungus has been reported as attacking both white (Melilotus alba) and yellow (M. officinalis)sweet clover, but a rather detailed search of the literature available has failed to show any record of sour clover (M. indica)as a host for S. sclerotiorum. Joshi (The wilt disease of safflower. Mem. Dept. Agr. India, Bot. Ser. 13: 39-46,1924) states that M. indica was not attacked by this fungus in India.

A Cercospora leafspot also was abundant on M. indica during February. No record of a Cercospora on this host is at hand. Spores from leaves collected just following a week of rainy weather measured 2-3.6 x 27 - 38μ. Horsfall (Species of Cercospora on Trifolium, Medicago, and Melilotus. Mycologia 21: 304-312. 1929) considers all of the Cercosporas on Melilotus spp. reported in the literature (with the possible exception of C.meliloti) as identical and uses the name C. zebrina Pass. to designate this species. The spore measurements for the Cercospora on M. indica fall within the range given by Horsfall for C. zebrina, hence it is considered to be that species.

CHICAGO MARKET PATHOLOGY NOTES

G. B. Ramsey

APPLE: Yellow Newton apples from the northwest have recently shown on inspection a rather high percentage of bulls-eye rot (Gloeosporium perennans) in advanced stages. One car inspected at Chicago for an export certificate showed 3 to 5 per cent decay. Several lesions about the stem and calyx ends were 1-1/2 inches in diameter and the decay penetrated to a depth of one inch.

A heavy infection of Ohio Rome Beauty apples characterized by numerous small, sunken, brown spots about the lenticels proved to be due to Alternaria and Cladosporium. Individually and collectively these two fungi caused considerable loss in one or two lots of apples that came to our attention in January.

AVOCADO: Up until the present time very little decay has been found upon avocados on the market, but recently one lot was found showing serious decay by Rhizopus. An Alternaria and a Colletotrichum were also responsible for some decay. While most boxes showed none, some boxes showed from 5 to 35 per cent decay. This stock was all of the Fuerte variety from California.

CELERY: During the past month certain lots of Florida celery have been badly blemished by "Cracked stem". Although bacterial soft rot does not occur in this cracked tissue as often as might be expected, the bad appearance of the bunches greatly reduces their market value. Mosaic and early blight have also been prevalent in Florida celery lately.

PEAS: California peas are showing an unusual amount of mottling and distortion of the pods as a result of mosaic infection. Well advanced stages of pod spot (Ascochyta) have also been noted in several shipments.

Three samples of peas received from the Crystal Springs, Mississippi, area have shown severe infections by Bacterium pisi and Peronospora viciae. The characteristic yellowish blotches and cloudy spots in the pod walls gave evidence of the presence of the oospore stage of Peronospora, but as usual the conidial stage was not present on the pods.

SPINACH: In addition to showing considerable storm injury or wind whipping Texas spinach has been affected somewhat by downy mildew (Peronospora effusa). From the marketing standpoint some of this spinach was of interest because of the presence of the oospore stage of Peronospora. This stage was evidenced by small cream-colored mats of mycelium on and within the epidermal tissues on the under sides of the leaves. The oospore and conidial stages never seemed to be assoc-

iated in the same lesion. The upper epidermis was only slightly discolored above the mycelial mat bearing the oospores, whereas the large distinctly yellowish blotches were noted on the top surface of the leaves directly above the lesions induced by the conidial stage. (April 20)

VARIOUS REPORTS ON PLANT DISEASES

APPLE RUST IN WISCONSIN: Telial horns of Gymnosporangium juniperi-virginianae now extended 2 to 3 mm. and will probably discharge during the next rain period. They did not discharge during the rain of April 23. Galls are less abundant this spring than normal. (R. E. Vaughan, April 25)

BLIGHT ON PEAR IN TENNESSEE: Blight (Bacillus amylovorus) on pear has occurred in epidemic form this year and is doing a great deal of damage. It was first observed by J. O. Andes, April 9. (Paul R. Miller, May 6)

LEAF SPOT OF CHERRY IN WISCONSIN: The abundance of overwintering perithecia of Coccomyces hiemalis in the Door County region indicates heavy infection if weather conditions are favorable in late May and June. (R. E. Vaughan. April 25)

BOTRYTIS NECK ROT ON IMPORTED ONIONS: About half of the onions in a shipment received by a Lexington, Kentucky, dealer from Chile, South America, via New York were affected with a Botrytis neck rot. Infection had occurred through the neck tissues and the scales below had a sunken, cooked appearance. Very little mycelium and no sclerotia were visible on diseased tissue. Diseased bulbs placed in a moist chamber in the ice box developed grayish mucelium and abundant spores of Botrytis on decaying areas in 24 hours. (E. M. Johnson. April 13)

CROWN ROT OF CLOVER AND ALFALFA IN KENTUCKY: A small amount of crown rot of red clover was found in January. About March 15 it developed in crimson clover and since has been found on red clover and alfalfa. Sclerotinia trifoliorum isolated from several specimens by L. Henson. Botrytis also was found causing crown rot of crimson clover. (W. D. Valleau, April 10)

THE RELATIVE PREVALENCE AND DISTRIBUTION OF THE VERTICILLIUM AND FUSARIUM WILTS OF TOMATO IN UTAH AND THEIR POSSIBLE RELATIONSHIP TO SUN SCALD OF TOMATO FRUIT (1934 SURVEY)

H. L. Blood

Sun-scalded fruit and wilted plants were responsible for a reduction of no less than 8.5 per cent in the 1934 Utah tomato crop. This represented a loss of approximately $270,000.00 to the tomato industry. The destruction, due almost entirely to sun scald, has been nearly as great annually for several years past but the monetary loss was not so great as in 1934 due to the greatly reduced value of the tomato crop in the depression years. During the 1934 picking season fields were very common in Weber and Davis Counties with 60 to 75 per cent of the fruit on the field sun scalded and worthless. Sun scald in addition to the prevailing heavy destruction by curly-top almost completely destroyed many fields that otherwise would have yielded a fair crop. It was almost impossible to go into a field in these counties without encountering some destruction from sun scald. Even in the counties to the north and the south sun scald was not unknown. Many fields in the Perry district to the north and in the Salem district to the south suffered from a fruit destruction of as high as 15 to 20 per cent due to this trouble.

Observations over a period of years have indicated that a vascular discoloration presumably induced by either the Fusarium or the Verticillium wilt pathogen is rather closely associated with the destructive sun scald of the tomato fruit in Utah. The pathogenic action of the organism involved is rather weak and is exhibited by an invasion of the vascular system and a subsequent yellowing and wilting of the large basal and central leaves of the tomato plant. These leaves function on the healthy plant by protecting the fruit from the direct rays of the sun and their destruction by whatever means exposes the fruit to the intense sunlight and scalding invariably follows.

Data were collected during the 1934 growing season in connection with the curly-top disease survey to ascertain the relative prevalence and distribution of the Fusarium and the Verticillium wilt organisms in the tomato growing districts of the state and their possible relationship to the sun scald problem. The results of the survey are summarized in Table 7 and Figure 41.

The five counties, Boxelder, Weber, Davis, Salt Lake, and Utah, comprise the commercial tomato growing section of the State. One hundred sixty-six fields in the districts where wilt was found were visited from one to three times during the progress of the survey. Of these fields 63 were found to be infected with wilt. Apparently

Table 7. Distribution of Verticillium and Fusarium wilt of tomato in five counties of Utah as determined by 1934 Survey

County	District	Number of Fields Visited	Number of Fields Infected with Wilt	Number of Isolations Made	Isolations of Verticillium	Isolations of Fusarium
Boxelder	Dewey	2	1	2		2
	Tremonton	9	3	13		12
	Perry	5	4	10	4	5
	Total	16	8	25	4	19
Weber	Vicinity of Ogden	5	4	19	19	
	West Ogden	2	2	14	11	
	Kanesville	2	1	2	1	1
	Hooper	43	11	34	31	3
	Orchard	5	1	5	5	
	Roy	18	12	65	52	4
	Gifford	6	1	3	3	
	Total	81	32	142	122	8
Davis	Sunset	2	2	6	5	
	West Point	13	2	5		5
	Clearfield	3	1	1	1	
	Syracuse	10	3	12	3	"
	Layton	11	3	7	7	
	West Layton	9	2	3	2	1
	Kaysville	5	1	2		2
	Farmington	2	2	38	36	
	Total	55	16	74	54	8
Salt Lake	Nothing	-	-	-	-	-
Utah	Orem	4	2	12		12
	Salem	10	5	16	8	8
	Total	14	7	28	8	20
	GRAND TOTAL	166	63	269	188	55

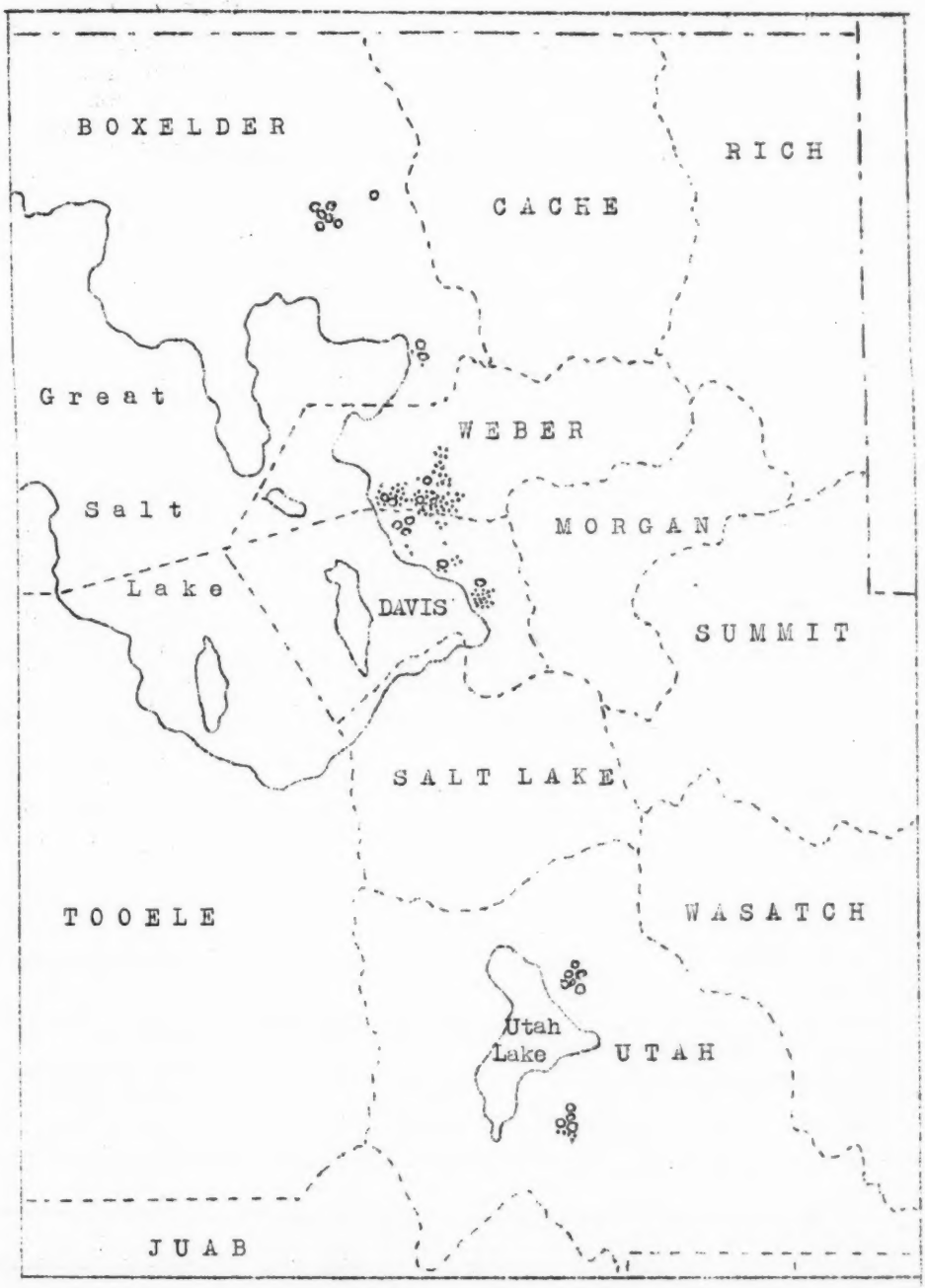

Figure 41. Distribution of Verticillium (dot) and Fusarium (circle) wilt of tomato in northern Utah, as determined by the 1934 survey

infected material was collected from the fields and 269 isolations were made. Of these isolations 188 yielded the Verticillium and 55 the Fusarium. Either the Verticillium or the Fusarium developed in one or more isolations from material collected from each infested field. It was observed that the Fusarium predominated in isolations from Boxelder and Utah Counties and the Verticillium in those from Weber and Davis Counties. The latter two counties produce the largest acreage of canning tomatoes and also suffer the greatest damage from sun scald.

Both Fusarium and Verticillium had made their appearance in the fields by June 20 and continued to develop during the remainder of the season. The Fusarium wilt was more severe in its effect on the plants. Fusarium-infected plants were stunted and dark green in color, the growing points were rosetted, and the vascular system was stained a dark brown and often partially disorganized. The plants, often displaying a condition of differential infection in the various branches, were not quickly destroyed but were usually fruitless and eventually succumbed to the disease.

The Verticillium wilt was less destructive and produced no evident stunting and only a mild wilting during the heat of the day. During the night the plants would recover. The basal and large central leaves would eventually turn yellow, die and drop off. Plants infected with Verticillium were never observed to wilt completely and collapse as they do frequently with the Fusarium wilt. The vascular system is discolored but the degree of discoloration while sometimes approximating that caused by Fusarium is usually much lighter, ranging from a very light tan to a light chocolate. The destruction of the basal foliage by Verticillium is the most damaging development associated with the disease. The result is a degree of sun scalding of the fruit closely proportional to the foliage destruction. The fruitfulness of the plant infected with Verticillium does not appear to be reduced greatly except on rare occasions.

Toward the latter part of the growing season the material collected in fields showing considerable sun scald yielded the Verticillium organism almost entirely. Diseased specimens sent in by field men of the canning companies also invariably yielded Verticillium. None of the fields which yielded only the Fusarium wilt organism developed any appreciable amount of sun scald. In such fields only a few infected plants were found and such plants were badly wilted or stunted and bore no marketable fruit. In all fields infected with the mildly pathogenic Verticillium the infection was usually quite general, sun scald was prevalent, and the Verticillium was isolated with ease.

While the survey indicated a very close correlation between the prevalence of sun scald and infection with Verticillium wilt it is entirely probable that Verticillium is not the only factor involved in the sun scald problem. Tomato fields in which the plants bore unmistakable indications of malnutrition and fields on soils that were evidently rather depleted showed varying degrees of sun scald. Invariably, however, where sun scald was serious Verticillium-infected plants were plentiful.